

Bangor, 2nd, p. m. and 3rd, p. m.; St. Vincent, Minn., 3rd, a. m., and 5th, a. m., 12th, a. m., 26th, p. m., 27th, p. m. and 29th, a. m.; Beloit, the 21st, p. m. and Rochester, 30th, a. m.

Zodiacal Light.—*Connecticut.*—Southington, 30th, 31st. *Cuba.*—Havana, 1st, 2nd, 3rd, 23rd, 24th, 28th, 29th. *Indiana.*—New Corydon, 6th, 7th, 9th, 11th, 30th, 31st. *Iowa.*—Cresco, 31st; Monticello, 2nd. *Kansas.*—Lawrence, 6th, 9th, 10th, 29th, 30th, 31st. Yates Centre, 1st, 2nd, 29th, 30th, 31st. *Massachusetts.*—Cambridge, 3rd, 4th, 18th, 19th, 22nd, 23rd, 28th, 30th, 31st; Rowe, 30th, 31st; Somerset, 3rd, 4th, 22nd, 23rd, 30th, 31st; Williamstown, 2nd. *Minnesota.*—St. Vincent, 2nd, 3rd, 5th, 6th, 10th, 11th, 29th. *Nebraska.*—Clear Creek, 1st, 29th, 30th, 31st. *New York.*—Waterburg, 4th, 6th, 9th, 28th. *Ohio.*—Bellefontaine, 18th, 27th, 30th, 31st. *Pennsylvania.*—Dyberry, 31st. *Tennessee.*—Nashville, 2nd, 3rd, 6th, 7th, 8th, 9th, 11th, 30th, 31st. Abstract of Mr. Ohas. Hasselbrink's observations at Havana, Cuba, continued from the REVIEW for September, 1880. *October*, 6th, 1880, 8 p. m., inclination 40 degrees and at 8:30 p. m., 45 degrees to the south; intermittences few and incomplete; tint *warm* to bluish white; 9 p. m., obscured. Light visible on *October* 25th, 26th, 30th, 31st and *November*, 1st and 23rd. *November* 24th, from 6:30 p. m., visible, with marked intensity, inclination 45 degrees to south; during an intermittence, that portion of the milky way previously masked by the light became more visible. 25th, of good intensity and frequent intermittence. 26th, 27th and 28th, visible; 29th, from 6:30 p. m., great intensity, whitish, cone pretty well defined, intermittences well marked, base very luminous. 30th, same as 29th, intermittences very long and return of light slow, no effluvia.

OPTICAL PHENOMENA.

Mirage.—Portsmouth, N. C., 14th, exhibiting country and trees thirty miles distant. Genoa, Neb., 5th, 6th, 12th, 22d, 31st. Captain John O. Spicer, of schooner *Era*, on a voyage to Hudson's Bay and return, reports August 14th and 15th, 1879, in 67° 39' N., 80° 08' W., beset in ice, day pleasant and calm, land 32 miles and open water 16 miles to west; the refraction was so great that little pieces of ice in the water and the patches of snow on the land could be plainly seen, appearing to be about 6 degrees above horizon.

Halos.—From the 29th to the 31st of December, solar halos of great perfection were very generally observed in the Ohio, Upper Mississippi and Lower Missouri valleys. Halos of 22° radius and 46° radius were seen. In most cases prismatic colors distinctly appeared and parhelia or mock-suns, varying in number from two to five; brilliant contact arches were likewise observed. Halos with mock-suns were seen most frequently on the 29th in Iowa, on the 30th in Ohio, Indiana, Illinois and Missouri, and on the 31st in Michigan and Wisconsin.

MISCELLANEOUS PHENOMENA.

Meteors.—The following are the only meteors of interest reported during December, 1880: 9th Charlotte, N. C., soon after sunset, very brilliant in southwest part of heavens; moved slowly in a westerly direction; seemed to be about the size of the crown of a man's hat and was visible for nearly 10 minutes; it did not disappear suddenly but gradually grew smaller until it vanished near the western horizon. Jacksonburg, Ohio, p. m.—very brilliant. Aiken, S. C., 5:15 p. m.—brilliant meteor like a bursting rocket; a remarkable feature was the trail, which remained visible for more than 20 minutes as noted by the watch. During such time the straight trail was apparently changed into a wavy one by the wind's action. Mayport, Fla., at sunset, meteor, of intense whiteness, moving slowly toward the north from the zenith; was in sight some seconds. Chattanooga, Tenn.,—observed just before sunset; very brilliant; moved from a point southeast of zenith obliquely to the eastern horizon; exploded into fiery fragments; trail, reddish hue, drifted to the west and quickly disappeared. 10th, Mayport, Fla., 3 a. m.—brilliant light from the east, illuminating whole house, shortly followed by an explosion which jarred the house and awakened the family. Fayette, Miss., 5.40 a. m.—very brilliant; passed from east to west. 11th (10th?), Savannah, Ga., 2.50 a. m.—visible for nearly a minute; moved from east to west. It apparently burst, although no noise was heard. In bursting, very large fiery balls, scattered in every direction, left a trail of vaporous smoke for a few seconds. Observers state that it completely lighted the city and presented a most dazzling sight. 12th, Pioche, Nev., 4.45 a. m., course W. by NW.; light as day for about ten seconds. 13th, Little Rock, Ark., 4.50 p. m.—brilliant meteor; altitude, 45°; moving west. Disappeared 15° above horizon. 29th, Cairo, Ill., (no time),—very brilliant; color, green; moved from Orion southwestward, disappearing 10° above horizon, followed by a train of red light 20° long. Captain J. O. Spicer, of the schooner *Era*, in 63° 15' N., 64° 10' W., reports: November 12th, 1879, "at 11 p. m. saw one of the most brilliant meteors fall in the NE. illuminating the whole heavens, and at 11:45 p. m. another in the N.; many shooting stars observed all night and in all directions."

Earthquakes.—In connection with the numerous earthquakes on the Pacific coast it is noted as of possible interest, that violent eruptions of the volcano Mauna Loa, Hawaii, recommenced on December 10th, 1880. *California:* San Diego, 19th, 3:40 p. m., sharp shock—few seconds duration; motion from SE. to NW. Shocks were felt at San Luis Rey, San Juan, and Santa Anna at the same time. 21st, 11 p. m., duration few seconds; motion from SE. to NW. Los Angeles, 19th,

3:35 p. m., three shocks lasting about two seconds, with intervals of two or three seconds; motion apparently horizontal and from SE. to NW.; phenomenon more decided in country east; at San Bernardino courthouse, walls cracked from base to eaves. Campo, 21st, 11.04 p. m., sharp shock. 22nd, 3:22 a. m., sharp shock, followed by a lighter one; motion from SE. to NW., accompanied by a heavy rumbling noise like distant thunder; buildings shook so as to awaken everybody. Tecaluma, San Diego county, 26th, 2:30 p. m., slight shock; 28th, 11 p. m., severe shock. *Oregon*: Portland, 12th, between 8:40 and 8:50 p. m., slight shock in various parts of city. People were startled by the sudden rocking of their dwellings; glass pendants of chandeliers were seen to vibrate violently and several clocks were stopped; no serious damage was reported. *Washington Territory*: Olympia, 7th, 5:54 p. m.—slight shock; motion from SW., lasting a few seconds, another lighter shock reported during the night. 12th, 8:40 p. m., four shocks lasting from 9 to 15 seconds. Port Townsend, 12th, 8:30 p. m.—severe shock, "heavier than one of last week," (7th?) no damage reported. Seattle, 12th, 8:36 p. m.—severe shock, vibrations from SE. to NW. In some instances lamps vibrated four to six inches out of the perpendicular each way. Whatcomb, 27th, 3 a. m.—"Whole summit of Mt. Baker lighted up in grand style and as plain as if seen by sunlight, the fire shooting up far beyond the mountain top in bright flashes, carrying huge red sparks of lava." Bainbridge Island, 7th, 5:45 p. m., N. to S., motion wavy; 10th, 5 a. m., motion perpendicular; 12th, 8:40 p. m., N. to S., motion wavy; 14th, 7 p. m., tremulous; 20th, 11:16 p. m., wavy; 29th, 11:25 p. m., wavy; all shocks distinct but not severe. *British Columbia*: Victoria, 12th, 8:45 p. m., slight shock. *Minnesota*: St. Vincent, 28th, 1:15 a. m., vibrations like earthquake shock.

Sunsets.—The characteristics of the sky at sunset as indicative of fair or foul weather for the succeeding twenty-four hours have been observed at all Signal Service Stations. Reports from 169 stations show 5,198 observations to have been made, of which 35 were reported doubtful; of the remainder, 4,113 or 79.2 per cent. were followed by the expected weather.

Sun Spots.—The following record of observations, made by Mr. D. P. Todd, Assistant, has been forwarded by Prof. S. Newcomb, U. S. Navy, Superintendent Nautical Almanac Office, Washington, D. C.:

DATE— Dec., 1880.	No. of new—		Disappeared by solar rotation.		Reappeared by solar rotation.		Total number visible.		REMARKS.
	Groups	Spots.	Groups	Spots.	Groups	Spots.	Groups	Spots.	
1st, 4 p. m...	0	0	0	0	0	0	2	15	
2nd, 8 a. m...	1	3	0	0	1	3	3	15	
3rd, 8 a. m...	1	5	0	0	1	5	3	10	Faculae.
4th, 8 a. m...	2	4	0	0	0	0	5	14	Faculae.
1 p. m...	2	3	0	0	0	0	7	25†	Faculae. Many of the spots small.
2 p. m...	0	0	0	0	0	0	7	25†	
7th, 9 a. m...	0	5	3	5	0	0	4	25	Faculae.
9th, 9 a. m...	0	0	1	5	0	0	3	15	Faculae.
10th, 9 a. m...	0	0	0	0	0	0	3	15	Faculae.
11th, 1 p. m...	0	0	0	0	0	0	2	10	
12th, 1 p. m...	0	0	0	0	0	0	2	10	
15th, 9 a. m...	0	0	2	10	0	0	0	0	Faculae. Spots probably disappeared by solar rotation.
17th, 1 p. m...	2	9	1	0	2	9	2	9	
18th, 1 p. m...	0	3	0	0	0	3	2	12	Faculae.
18th, 4 p. m...	0	0	0	0	0	0	2	12	Faculae.
19th, 9 a. m...	0	0	0	0	0	0	2	12	Faculae.
22nd, 9 a. m...	1	1	0	0	1	1	3	4	Faculae.
23rd, 9 a. m...	0	10	0	0	0	0	3	14	Faculae.
23rd, 9 a. m...	2	5	0	0	2	5	3	8	Faculae. Spots probably re-appeared by solar rotation.
27th, 4 p. m...	0	0	0	0	0	0	3	6	Faculae.
30th, 9 a. m...	0	0	0	0	0	0	3	6	Faculae.
31st, 8 a. m...	1	4	0	0	0	0	4	10	Faculae.

† Approximated.

NOTES AND EXTRACTS.

The following is extracted from a memoir by M. Dechevrens, S. J., on a "magnetic storm at Zi-ka-wei, near Shanghai, China, in August, 1880:"

Magnetic Perturbation of August 11th–14th, 18th and 19th, 1880.—"The perturbation of the 11th–14th, 1880, is the most important registered at Zi-ka-wei," * * * "The intensity of these perturbations in this locality, which is quite a southerly one, will be apparent, less from the absolute size of the abnormal oscillations of our magnetic needles, than from the really striking contrast of the curves, so marked and changeable, with the perfectly regular curves almost daily obtained. Indeed, the mean curves for the year 1879, which we have thought proper to place side by side with the photographic traces during the long period of disturbance might as well have been replaced by a monthly or even by a daily curve taken at random.

"The third of our variation-compasses, the *balance-magnet*, (vertical component of terrestrial magnetic intensity,) experienced, notwithstanding its slowness of motion, quite marked variations at the times of the greatest disturbance. Suffice it to say that the greatest oscillations of the balance-magnet have been simultaneous with the oscillations of the two others, that they have been in a direction contrary to those of the biflar, showing indeed a great increase of the vertical component of intensity, whilst the horizontal component experienced a corresponding diminution: so that the general effect of the perturbation was to increase the vertical component and diminish the horizontal. On the other hand the magnetic declination, which in this place is 2° W., constantly varied inversely to the horizontal component, but with comparatively less amplitude.